SEATTLE CITY LIGHT WORK ORDER #89-16

EXCAVATED SOILS TESTING AT THE GEORGETOWN STEAM PLANT

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I. INTRODUCTION

In November, 1989, Raven Services Corporation acquired samples from a pile of excavated soil south of the Georgetown Steam Plant that resulted from the removal of several tanks. These tanks were three residuum fuel tanks that, in the past, stored Bunker C oil to fire the plant boilers. Also removed was a smaller heating oil tank.

The soils around the tanks were tested in 1984 [Work Order #84-1], and the soils and tank contents were further tested in October, 1987 [Work Order #87-17]. The present testing will provide information on soil contamination levels and will allow assessment of disposal options for the stockpiled soil.

II. SAMPLING METHODOLOGY

A. Container and Sampling Equipment

All samples were placed in 270 ml wide-mouth glass containers that had been pre-cleaned. The metal screw cap lids were lined with aluminum foil such that the dull side was in contact with the sample.

The pre-cleaning procedure involved scrubbing with a special petrochemical dissolving soap [HarborMaster Products, Inc., Edmonds, Washington]. The terminal end of the brush applied had sufficient bristles to scrub the seam where the side connects with the bottom. A final rinsing with hexane was undertaken to remove any invisible greases and detergent residues.

The surface samples were acquired with a stainless steel trier. The deeper samples were extracted with a 6" diameter soil auger. Tools were cleaned with the aforementioned detergent and rinsed with hexane. The tools were buffed free of rust before arriving at the site.

B. Field Observations

Data on the collection process and observations of the physical nature of the sample were kept in the bound field log book. The format for this book is chronological.

C. Sampling Strategy

In accordance with EPA SW-846, sampling strategy was chosen from sections most analogous to the nature of the site. These sections are "waste piles" [1.4.3] and "landfills" [1.4.4]. Individual decisions were required for this site with the purpose of the study in mind. The number and location of samples were chosen in anticipation of an inhomogeneous distribution.

D. Sample Collection

Method 8080 was used for guidance for the PCB samples. Method 8100 in the EPA SW-846 manual describes the protocol used for handling of the polynuclear aromatic hydrocarbons samples. Compliance with these instructions necessitated using glass containers and specified conditions for refrigeration. All samples in our case were delivered to the laboratory in time to comply with the maximum seven days storage for extraction and thirty days for complete analysis.

Approximately 200 grams of soil from the tools were placed in the sample jar for laboratory analysis. A description of the individual samples appears in Table II.

E. Analysis

For total petroleum hydrocarbons, the WDOE guidelines refer to EPA 62516-761001 Method #418.1. In accordance with Method 418.1, the samples were air dried and extracted with freon. The freon extracts were subjected to infra-red analysis. The signals were compared to specified oil calibration standards used to calculate TPH. These include hexadecane, iso octane and chlorobenzene.

The procedure for PCB analysis follows Method 8080 with state-of-the-art modifications. The signals were obtained on an HP-5890 gas chromatograph with an HP-101 column. Results are listed in Table I.

III. RESULTS & DISCUSSION

No PCBs were detected in any of the soil pile samples. Total petroleum hydrocarbons, however, ranged from 63,800 ppm to 8.6 ppm. The distribution of these hydrocarbons appears correlated with the presence of the oily crust on the surface samples. The deeper samples were fill sand, and contained 555 and 1027 ppm respectively. The hydrocarbon distribution is not uniform throughout the pile.

A possible explanation for this distribution may be the sequence of events during excavation. When the tanks were installed, fill sand was placed around each tank to a depth of fourteen feet [Work Order #84-1]. It appears that after the tanks were removed, the fill sand was removed to the soil pile; the site was then cleaned up, resulting in the oil-encrusted surface clay ending up on the outer areas of the pile.

The volume of the excavated soils was estimated as follows:

Contour Section	Area
0'	896
1'	776
2'	650
3'	535
4'	419
5'	323
6'	231
top[s]	12
	3832 cu ft

$$\frac{3832 \text{ cu ft}}{27 \text{ cu ft/cu yd}} = 142 \text{ cubic yards}$$

This estimate is probably high for two reasons: 1) the pile is drawn less oval-shaped than it actually is, and 2) the slope between each contour has not been taken into account.

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TABLE I

SAMPLE LISTINGS

Sample #	Location	Depth [Inches]	PCB [ppm]	TPH [ppm]
SP-1	North edge	0-3	ND*	67,600
SP-2	Southwest slope	0-2	ND	8.8
SP-3	Southeast slope	0-3	ND	8.6
SP-4	Top	0-3	ND	63,800
SP-5	Top	44-48	ND	555
SP-6	Top	68-72	ND	1,027

* ND - not detected at the 0.01 ppm level

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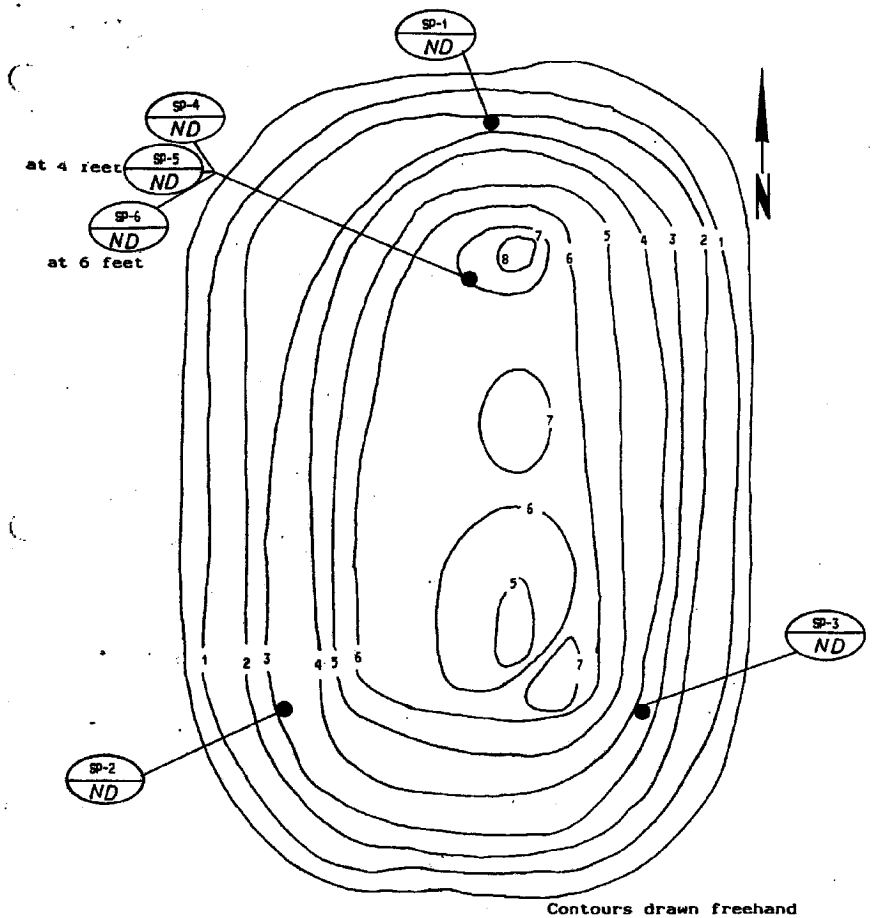
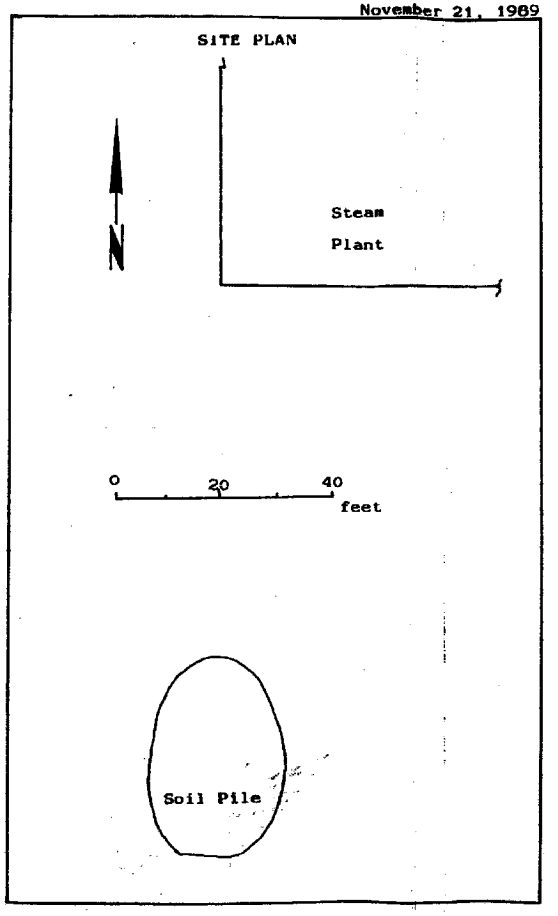
TABLE II

SAMPLE DESCRIPTIONS

Sample #	Description
SP-1	sandy clay with brown clods stained black with oil
SP-2	fluffy clay/silt with tan, dry appearance
SP-3	brown sandy clay interspersed with traces of mortar
SP-4	clods caked with hardened black oil crust; clods are brown clay/silt
SP-5	same hole as SP-4; at 1.5' down, the brown fill sand appeared
SP-6	brown fill sand

November 21, 1989





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Georgetown S.P. Soil Pile

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